Gennady Gorin, Ph.D.

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As an academic and industry researcher, I have combined bioinformatics and physics to improve single-cell analyses and innovate active pipelines for therapeutic discovery. I am looking for a role that would use the depth of my interdisciplinary background to develop revolutionary models, putting my team at the forefront of the industry and enabling research that changes lives for the better.

EDUCATION

Ph.D., California Institute of Technology (Lior Pachter Laboratory) 09/18–06/23
- Academic laboratory developing end-to-end, physically informed bioinformatics methods
- Developing physical theory and scalable stochastic methods for multi-modal single-cell sequencing data
- Organizing cross-disciplinary, multi-institution collaborations in physics and machine learning
- Building, training, and leading a subgroup dedicated to addressing gaps in current methods

Rice University, Summa Cum Laude, GPA 4.06 07/13–12/17
- Bachelor of Science in Chemical and Biomolecular Engineering
- Bachelor of Arts in Chemistry and Asian Studies

TECHNICAL SKILLS

Computation: Python (NumPy, SciPy, PyTorch, pandas), MATLAB, bash, CentOS administration
Data: bioinformatics (*kb*, *scanpy*, *velocyto*, *Monod*) for multi-modal single-cell RNA sequencing technologies
Modeling: stochastic biophysical modeling, simulation, and inference; variational autoencoder design
Mathematics: stochastic processes, partial differential equations, approximation theory

COMMUNICATIONS SKILLS

Interpersonal: collaborating in a fast-paced pharma startup, building effective teams for solving problems
Written: scientific manuscripts, industry technical reports
Visual: data visualization, qualitative illustrations of mathematics and biophysics
Verbal: seminar presentations to specialist and non-technical audiences, scripted and unscripted theater
Languages: native English and Russian; elementary French and Mandarin

RESEARCH INTERNSHIPS

Data Sciences Co-op (Celsius Therapeutics) 06/22–08/22
- Pharmaceutical startup leveraging transcriptomic analyses to develop therapeutics
- Designed methods to decipher transcriptional mechanisms of disease states for drug discovery
- Integrated analyses into the company's cloud computational pipeline for large patient datasets

Research Intern (Golding Laboratory, Baylor College of Medicine) 02/17–09/18
- Academic laboratory synthesizing experiments and biophysics to decipher cell biology
- Designed stochastic simulations and statistical analyses of microbial gene regulation
- Organized a collaboration at the Xu Laboratory, Shanghai Jiao Tong University, to develop algorithms

NSF Research Experience for Undergraduates (Douglas Laboratory, Indiana University) 05/16–07/16
- Academic laboratory developing virus-like particles as a biotechnology platform
- Designed and constructed a reactor to investigate flow kinetics of encapsulated enzymes

Future Chemists International Summer Camp (Lu Laboratory, UST China) 06/15–07/15
- Undergraduate-level research and cultural immersion program
- Assisted a graduate student mentor in investigating novel palladium catalysts
- Synthesized nanoparticles and monitored activity by gas chromatography

Research Assistant (Zubarev Laboratory, Rice University) 09/13–05/14
Academic laboratory studying nanoparticle applications
Synthesized, functionalized, and analyzed gold nanoparticles
Closely assisted a graduate student mentor in optimizing synthetic conditions

Welch Summer Scholar Program (Smith Laboratory, UT Dallas) 06/12–07/12
High school-level chemistry research program across the University of Texas system
Synthesized and characterized medical carbon fiber precursors
Presented findings and program feedback to student participants and professors

PUBLICATIONS – SCIENCE (ORCID RECORD)

Gorin G, Yoshida S, Pachter L. Assessing Markovian and Delay Models for Single-Nucleus RNA Sequencing. *Bulletin of Mathematical Biology*; 2023 Oct.

Gorin G, Vastola JJ, Pachter L. Studying stochastic systems biology of the cell with single-cell genomics data. *Cell Systems*; 2023 Sept.

Chari T, **Gorin G**, Pachter L. Biophysically Interpretable Inference of Cell Types from Multimodal Sequencing Data. *bioRxiv*; 2023 Sept.

Carilli M*, **Gorin G***, Choi Y, Chari T, Pachter L. Biophysical modeling with variational autoencoders for bimodal, single-cell RNA sequencing data. *bioRxiv*; 2023 May.

Gorin G, Pachter L. Distinguishing biophysical stochasticity from technical noise in single-cell RNA sequencing using *Monod*. *bioRxiv*; 2023 Apr.

Gorin G, Pachter L. The telegraph process is not a subordinator. *bioRxiv*; 2023 Jan.

Gorin G, Pachter L. Length Biases in Single-Cell RNA Sequencing of pre-mRNA. *Biophysical Reports*, 2023 Mar.

Gorin G*, Vastola JJ*, Fang M, Pachter L. Interpretable and tractable models of transcriptional noise for the rational design of single-molecule quantification experiments. *Nature Communications*; 2022 Dec.

Gorin G, Fang M, Chari T, Pachter L. RNA velocity unraveled. *PLoS Computational Biology*; 2022 Sep.

Gorin G*, Carilli M*, Chari T, Pachter L. Spectral neural approximations for models of transcriptional dynamics. *bioRxiv*; 2022 Jun.

Gorin G, Pachter L. Modeling bursty transcription and splicing with the chemical master equation. *Biophysical Journal*; 2022 Feb.

Vastola JJ, **Gorin G**, Pachter L, Holmes WR. Analytic solution of chemical master equations involving gene switching. I: Representation theory and diagrammatic approach to exact solution. *arXiv*; 2021 Mar.

Gorin G, Pachter L. Intrinsic and extrinsic noise are distinguishable in a synthesis–export–degradation model of mRNA production. *bioRxiv*; 2020 Sep.

Gorin G, Pachter L. Special function methods for bursty models of transcription. *Physical Review E*; 2020 Aug.

Gorin G, Wang M, Golding I, Xu H. Stochastic simulation and statistical inference platform for visualization and estimation of transcriptional kinetics. *PLoS ONE*; 2020 Mar.

Gorin G, Svensson V, Pachter L. Protein velocity and acceleration from single-cell multiomics experiments. *Genome Biology*; 2020 Feb.

PUBLICATIONS – HUMANITIES

Gorin G. *Caltech Totem*; 2021 Jun. https://caltechtotem.github.io/archives/issues/2021.pdf

Gorin G. *Caltech Totem*; 2020 Jun. https://caltechtotem.github.io/archives/issues/2020.pdf

Gorin G. *Rice Asian Studies Review*. 2018 Apr; 2:11–17. https://rasr.rice.edu/issue2/RASR_VOLUME_2.pdf

Gorin G, Huang S-s S. *SSRN*; 2017 May. https://doi.org/10.2139/ssrn.3476124

WORK AND LEADERSHIP EXPERIENCE

Teaching Assistant (Division of Chemistry and Chemical Engineering, Caltech) 10–12/19, 1–3/21
Graded graduate-level chemical engineering thermodynamics courses

Technical Intern (Houston Asian American Archive, Rice University) 09/15–05/17
Researched and proposed solutions for an oral history archive's website and storage
Created a video for university's celebration of Asian alumni attended by nearly 200 people
Operations Director/Secretary (KTRU Rice Radio, Rice University) 09/13–08/18
Managed PSA and promotion rotation of an FM college radio station
Ensured compliance with FCC regulations
Developed budgetary documentation and secured grant funds up to $25,000
Hosted a musique concrète radio show
Teaching Assistant (Department of Bioengineering, Rice University) 01/17–05/17
Developed rubrics for and graded an upper-level bioengineering numerical methods course
Teaching Assistant (Department of Chemistry, Rice University) 09/14–11/14
Graded a sophomore-level Organic Chemistry course

SOFTWARE

Carilli, M; Choi, Y; **Gorin, G**. *biVI*: physically motivated variational autoencoder (Python). 08/21
https://github.com/pachterlab/CGCCP_2023
Gorin, G. *Monod*: mechanistic transcriptional inference from sequencing data (Python). 08/21
https://pypi.org/project/monod/
Gorin, G. Generation, simulation, and solution of Markovian splicing processes (Python). 07/21
https://github.com/pachterlab/GP_2021_2
Gorin, G. Exact simulation of hybrid stochastic systems (Python/MATLAB/Octave). 02/21
https://github.com/pachterlab/GVFP_2021
Gorin, G. protaccel: trajectory inference from protein/RNA datasets (Python).
https://pypi.org/project/protaccel/ 09/19
Gorin, G. Stochastic simulation for visualization and estimation of transcriptional kinetics (MATLAB). 09/19
https://data.caltech.edu/records/1287

CONFERENCES, PRESENTATIONS, AND PROFESSIONAL DEVELOPMENT

American Physical Society March Meeting talk 03/23
"Interpretable and tractable probabilistic models for single-cell RNA sequencing"
Theoretical Biophysics podcast episode 03/22
"Modeling bursty transcription"
Chen Neuroscience Research Building Weekly Seminar Series talk 03/22
"Parameterizing models of stochastic transcriptional dynamics with snapshot scRNA-seq data"
Cold Spring Harbor Laboratory Systems Biology 2022 talk 03/22
"Parameterizing models of stochastic transcriptional dynamics with snapshot scRNA-seq data"
Caltech Chemistry and Chemical Engineering Seminar Day presentation 10/21
"How should we think about cells?"
Gordon Research Conference on Stochastic Physics in Biology 2021 poster 10/21
"Markov models of RNA transcription and sequencing"
Society for Industrial and Applied Mathematics Dynamical Systems 2021 poster 05/21
"Modular and interpretable models of transcriptional noise and splicing"
Biophysical Society 2021 Annual Meeting poster 02/21
"Analysis of Length Biases in Single-Cell RNA Sequencing of Unspliced mRNA by Markov Modeling"
Cold Spring Harbor Laboratory Genome Informatics 2020 poster 09/20
"Analysis of Length Biases in Single-Cell RNA Sequencing of Unspliced mRNA by Markov Modeling"
Biophysical Society 2020 Annual Meeting poster 02/20
"Semi-Analytical Methods for RNA Burst Models"
Caltech Graduate Research Spotlight poster 05/19
"RNA velocity and protein acceleration from multimodal single-cell experiments"

q-bio 2018 Conference poster 06/18
"Simulating and Fitting Stochastic Models of RNA Transcription via the Gillespie Algorithm"
q-bio 2018 Summer School 06/18
Rice Engineering Design Showcase 04/17
"Cow Manure to Methanol by Hydrothermal Gasification"
Akers Senior Design Competition 04/17
"Cow Manure to Methanol by Hydrothermal Gasification"
Indiana University Materials Symposium poster 07/16
"A Flow Reactor Using Catalytic Bulk-Assembled Virus-Like Particles"

PERFORMANCE

IMPLiCIT, improvised theater troupe at the California Institute of Technology 10/18–03/22
EXPLiCIT, theater group at the California Institute of Technology 07/21–08/21
Lead (Felix) in *Humble Boy*
Comedy al Dente: *Commedia dell'arte* revival troupe 8/19–11/19

SCHOLARSHIPS AND HONORS

Dwane Rivers Memorial Scholarship in Chemical Engineering 09/17
Undergraduate Asian Studies Internship Award for summer internship in Asia 05/17
Louis J. Walsh Scholarship in Engineering 16–17
T.W. Moore Scholarship, awarded to 5 juniors with highest GPAs in department 16–17
Rice University President's Honor Roll, 6 out of 8 semesters at Rice University 13–17

AWARDS

Caltech Graduate Research Spotlight Second Prize Winner (out of 26 presenters) 05/19
Rice Engineers Week Student Competition Prize Winner (out of >20 teams) 02/14
Rice Center for Engineering Leadership Liftoff Winner 09/13

SOCIETIES AND PROFESSIONAL ACTIVITIES

Manuscript reviewer for BPS and SIAM society journals
American Physical Society: professional society, member since 2022
Biophysical Society: professional society, member since 2019
Phi Beta Kappa: liberal arts and sciences honor society, member since 2018
Tau Beta Pi: engineering honor society, member since 2016
American Institute of Chemical Engineers: professional society, member since 2013